

Taxonomic study of the *Macrophya malaisei* group with two new species (Hymenoptera: Tenthredinidae) in China

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Abstract: In this paper, the relationships and characteristics of the *M. malaisei* group, which now includes four known species worldwide, are briefly discussed. A key to the five known species of the *M. malaisei* group from China is provided, including two new species of the *M. malaisei* group, *M. diqingensis* Li, Liu & Wei sp. nov. and *M. tenuitarsalina* Li, Liu & Wei sp. nov.

Key words: Symphyta; Tenthredinoidea; Tenthredininae; taxonomy; sawflies

中国钩瓣叶蜂属玛氏钩瓣叶蜂种团 *Macrophya malaisei* group 分类并记两新种（膜翅目：叶蜂科）

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摘要: 记述采自中国钩瓣叶蜂属 *Macrophya* Dahlbom 玛氏钩瓣叶蜂种团 *M. malaisei* group 2 新种: 迪庆钩瓣叶蜂 *Macrophya diqingensis* Li, Liu & Wei sp. nov. 和细跗钩瓣叶蜂 *M. tenuitarsalina* Li, Liu & Wei sp. nov.; 简要讨论了 *M. malaisei* group 的主要鉴别特征, 编制了 *M. malaisei* group 中国已知种类检索表。

关键词: 广腰亚目; 叶蜂总科; 叶蜂亚科; 分类; 叶蜂

Introduction

Macrophya Dahlbom, 1835, the third largest genus in the Tenthredininae and the fourth largest of the family Tenthredinidae, contains 276 species worldwide (Li & Wei 2013; Li *et al.* 2013a, b, c, 2014a, b, 2016a, b; Liu *et al.* 2015a, b, 2016a, b; Shinohara 2015; Shinohara & Li 2015; Shinohara & Yoshida 2015). In China, 137 *Macrophya* species have been recorded (Li *et al.* 2012, 2013a, b, c, 2014a, b, 2016; Li & Wei 2012, 2013; Liu *et al.* 2015a, b, 2016a, b; Taeger *et al.* 2010; Wei *et al.* 2006, 2013; Wu *et al.* 2012; Zhang & Wei 2006; Zhao *et al.* 2010a, b; Zhao & Wei 2011; Zhu *et al.* 2012).

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The *M. malaisei* group is a small-sized group in the *Macrophya* with 4 previously known world species. One species, *M. malaisei malaisei* Takeuchi, 1937 occurs in Japan (Takeuchi 1937). In China, there are 3 species (Wei & Chen 2002; Wei & Ma 1997), namely *M. constricta* Wei & Chen, 2002 (Wei & Chen 2002), *M. malaisei* Takeuchi, 1937 (Takeuchi 1937) and *M. pilotheca* Wei & Ma, 1997 (Wei & Ma 1997). They are similar in general morphology and form a distinct species group. Here, the *M. malaisei* group is proposed and defined, another two new species belonging to this species group from Sichuan and Yunnan, China are described, and a key to all known species from China is provided.

Material and methods

Specimens were examined with a Motic-SMZ-168 stereomicroscope. Adult images were taken with a Nikon D700 digital camera and the series of images montaged using Helicon Focus (©HeliconSoft). All images were further processed with Adobe Photoshop CS 11.0.

Morphological descriptions of new species are based on the holotype. The terminology of genitalia follows Ross (1945) and that of general morphology follows Viitasaari (2002). For a few terms (e.g. middle fovea and lateral fovea), we follow Takeuchi (1952).

The specimens examined in this study, including all holotypes and paratypes of the new species, are deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China (CSCS).

Taxonomy

Macrophya malaisei species group

Diagnosis. Species of the *M. malaisei* group having slender body, mainly black; antennae entirely black; clypeus arched deeply, lateral lobes usually narrow and long; posterior corner of metepimeron not extended, without appendage; posterior margin of abdominal tergum 1 with white band; petiole of anal cell in fore wing long, but not longer than crossvein cu-a; valvaceps of penis valve normal, with an ergot.

The *M. malaisei* group is similar to the *M. sibirica* group by the following characters: body slender; clypeus arched deeply, lateral lobes usually narrow and long; petiole of anal cell in fore wing long, but not longer than crossvein cu-a. In *M. sibirica* group, body sturdy; clypeus usually shallow, lateral lobes short, anterior margin usually obtuse; anal cell in fore wing without petiole, but with short and erect crossvein. It is easily to be distinguished by these characters.

The *M. malaisei* group includes three known species from China and two new species from Sichuan and Yunnan Provinces are described here. They can be separated using the following key.

Key to the species of the *Macrophya malaisei* group from China

1. Dorsal side of hind tarsi with white maculae; subapex in dorsal side of hind tibia with a small white macula; hind trochanter entirely white; labrum entirely black; center of mesoscutellum with a small white macula; sheath shorter than hind tarsomer 1; middle serrulae nearly flat. China (Shaanxi, Henan).....

- *M. constricta* Wei & Chen
- . Hind tarsi entirely black; other characters different from the former..... 2
2. Fore wing with smoky maculae below stigma and narrower than the breadth of stigma, bound slightly clear; hind tarsomer 1 very slender, not sturdy, clearly longer than sheath; middle serrulae of lancet each with 1 proximal and 6–10 distal teeth. China (Sichuan)..... *M. tenuitarsalina* Li, Liu & Wei **sp. nov.**
- . Wings hyaline, fore wing without smoky macula absolutely; other characters different from the former..... 3
3. Dorsum of head not shiny, frons densely and minutely punctured, interspaces between punctures narrower than the diameter of puncture; abdominal terga 2–5 entirely black, without lateral white macula; middle serrulae clearly protruding. China (Anhui, Zhejiang, Hubei); Japan *M. malaisei* Takeuchi
- . Dorsum of head shiny, frons with some shallow punctures, interspaces between punctures broader than the diameter of puncture; abdominal terga 2–5 (7) clearly with lateral white maculae; other characters different from the former..... 4
4. Frons with some clear punctures, as high as the top of eyes; postocellar area not entirely black, with a “U”-shaped yellowish white macula; posterior margin of abdominal tergum 1 with clear yellowish white band, lateral sides broader than middle; a yellowish white macula narrower at subapex and about 2/5 times length of hind tibia; sheath clearly shorter than hind tarsomere 1; middle serrulae each with 1 proximal and 13–14 distal teeth. (Host plants: *Ligustrum quihoui*, *L. vicaryi*, *L. sinense*). China (Anhui, Fujian, Jiangxi, Hunan, Guangxi)..... *M. pilotheca* Wei & Ma
- . Frons with sparse shallow punctures, not clear, lower than the top of eyes; postocellar area entirely black; posterior margin of abdominal tergum 1 with narrow yellowish white band, lateral corners without yellowish white macula; a yellowish white macula broad at subapex and about 2/7 times length of hind tibia; sheath slightly shorter than hind tarsomere 1; middle serrulae each with 1 proximal and 6–7 distal teeth. China (Yunnan)..... *M. diqingensis* Li, Liu & Wei **sp. nov.**

1. *Macrophya diqingensis* Li, Liu & Wei **sp. nov.** (Figs. 1–8)

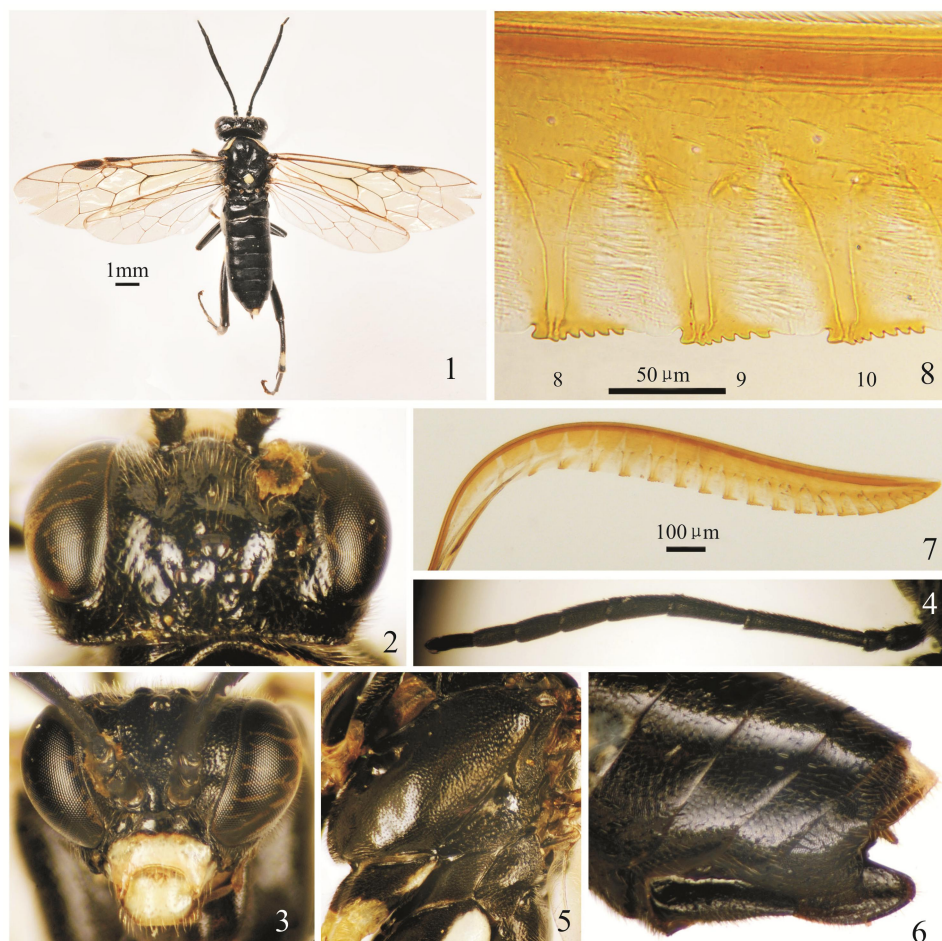
Female. Body length 8.0–8.2 mm. Body and legs black; palpi largely pale brown; following parts white: basal half of mandibles, labrum except for lateral sides with black maculae, clypeus, broad posterior margin of pronotum, outer margin of tegula, center of mesoscutellum, narrow posterior margin of abdominal tergum 1, small maculae on lateral corners of abdominal terga at times, transverse maculae on lateral corners of abdominal terga 3–5, center of abdominal tergum 10, apical margin of fore coxa, apical margin and stripes on outer side basally of middle coxa, apical margin and an oval macula on outer side basally of hind coxa, all trochanters, apical 1/2 stripes on anterior side of fore femur, basal margin of hind femur, anterior side of fore tibia, a small macula dorsally of middle tibia, a long macula dorsally 2/7 times as long as hind tibia, dorsal sides of fore and middle tarsi. Body hairs short and dense, silver; setae on sheath slightly curved, black brown. Wings hyaline, without smoky macula, stigma and veins black brown (Fig. 1).

Dorsum of head feebly shiny, frons shallowly and densely punctured, interspaces between punctures with fine microsculpture (Fig. 2); labrum and clypeus feebly shiny, both with sparse and shallow punctures, microsculpture fine; postocellar area largely with some shallow and large punctures, microsculpture fine. Mesonotum feebly shiny, minutely and densely punctured, interspaces narrow, with fine microsculpture; mesoscutellum shiny, with very sparse and shallow punctures, without distinct microsculpture; posterior of mesoscutellum dull, densely punctured; mesoscutellar appendage less shiny, with some shallow punctures and fine microsculpture; metascutellum slightly shiny, without distinct punctures, but with distinct

microsculptures. Mesepisternum slightly shiny, densely and rugosely punctured, interspaces narrow, upper half of mesepisternum with slightly larger punctures, lower half with slightly small punctures; anepimeron dull, rugosely punctured and wrinkled; posterior margin of mesepisternum and anterior margin 1/5 of katepimeron strongly shiny, without puncture or microsculpture, posterior part 4/5 of katepimeron with some shallow and large punctures and distinct microsculptures; metepisternum feebly shiny, with fine punctures and microsculpture on the outer side, with some punctures and distinct microsculpture; metepimeron feebly shiny, with shallow punctures and distinct microsculptures (Fig. 5). Lateral sides of abdominal tergum 1 with some shallow punctures, center nearly smooth; other abdominal terga less shiny, basal 1/3 area with distinctly small punctures, apical 2/3 area without distinct puncture, but with distinct microsculptures. Ventral side of hind coxa and outer side of hind femur with minute and dense punctures, smooth interspaces narrow, feebly shiny. Surface of sheath coriaceous, with very fine punctures and microsculpture.

Middle of labrum elevated, anterior margin truncate; clypeus weakly elevated, base broader than distance between lower corner of eyes, lateral sides distinctly convergent forwards, anterior margin incised to approximately 1/2 length of clypeus, lateral lobes narrow and long, anterior margin obtuse (Fig. 3); malar space 0.5 times as broad as the diameter of middle ocellus; middle of frons slightly depressed, lower than top of eyes in lateral view; middle fovea distinct, long puncture-like; lateral foveae slightly deep, short furrow-like; interocellar furrow distinct, postocellar furrow indistinct; POL : OOL : OCL = 4 : 12 : 9; postocellar area slightly elevated, 1.8 times broader than long, lateral furrows broad and deep, clearly divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete. Antenna slender, 1.3 times longer than head and thorax together (9 : 7), 0.9 times as long as abdomen (9 : 10); antennomere 2, 1.3 times as long as broad, antennomere 3, 1.6 times as long as antennomere 4 (11 : 7), 0.9 times as long as antennomeres 4 and 5 combined (11 : 13), subapical antennomeres weakly compressed and inflated (Fig. 4). Mesoscutellum roundly flat, without carina and peak, slightly lower than top of mesoscutum; mesoscutellar appendage with short and obtuse middle carina; metascutellum with low middle carina, mesopleuron and metapleuron as in Fig. 5; dorsal-posterior platform of mesepimeron as broad as diameter of middle ocellus; posterior corner of metepimeral appendage obtuse, without distinct appendage; distance between cenchri 2.2 times breadth of cenchrus. Inner tibial spur of hind leg 0.7 times length of hind tarsomere 1 (23 : 35); hind tarsomere 1 slender, about 1.8 times as long as following 4 tarsomeres together (7 : 6); claw with inner tooth shorter than outer tooth. Ovipositor sheath shorter than hind tarsomere 1 (3 : 4), apical sheath slightly shorter than basal sheath (7 : 8), apical margin roundish in lateral view (Fig. 6). Fore wing with crossvein cu-a joining cell 1M at basal 1/4, crossvein 2r joining cell 2Rs at apical 1/5, cell 2Rs slightly shorter than cell 1Rs; petiole of anal cell in fore wing as long as crossvein 2r-m and 1/2 times longer than crossvein cu-a; anal cell of hind wing 2/3 times longer than crossvein cu-a. Lancet with 19 serrulae (Fig. 7), middle serrulae slightly protruding and each with 1 proximal and 6–7 distal teeth, subbasal teeth large, annular spine bands broad, with slightly dense pilosity; 8th–10th serrulae as in Fig. 8.

Male unknown.



Figures 1–8. *Macrophya diqingensis* Li, Liu & Wei sp. nov. ♀, holotype. 1. Adult female, dorsal view; 2. Head of female, dorsal view; 3. Head of female, frontal view; 4. Antenna of female; 5. Mesopleuron and metapleuron; 6. Ovipositor sheath, lateral view; 7. Lancet; 8. 8th–10th serrulae of lancet.

Holotype. ♀, **China**, Yunnan, Deqin County, Mt. Meri Snow, 28°425'N, 98°805'E; alt. 2700 m, 20-VI-2009, Yihai ZHONG leg. **Paratype.** 1♀, **China**, Yunnan, Mt. Gong, Heiwadi, 27°800'N, 98°590'E; alt. 2100 m, 12-VI-2009, Wei XIAO leg.

Etymology. This new species is named after the locality of the type specimen, which is distributed in Diqing State of Yunnan Province, China.

Remarks. This new species is similar to *M. pilotheca* Wei & Ma, 1997, but can be distinguished from the latter by the above key.

Distribution. China (Yunnan).

2. *Macrophya tenuitarsalina* Li, Liu & Wei sp. nov. (Figs. 9–16)

Female. Body length 7.2–7.5 mm. Body and legs black; following parts sordid brown: palpi shortly, a narrow and short triangular anterior margin of labrum and anterior side largely of fore tibia; following parts white: base of mandibles, feeble macula on center of labrum, apical 2/3 of clypeus, posterior margin of postocellar area, narrow band on posterior margin of

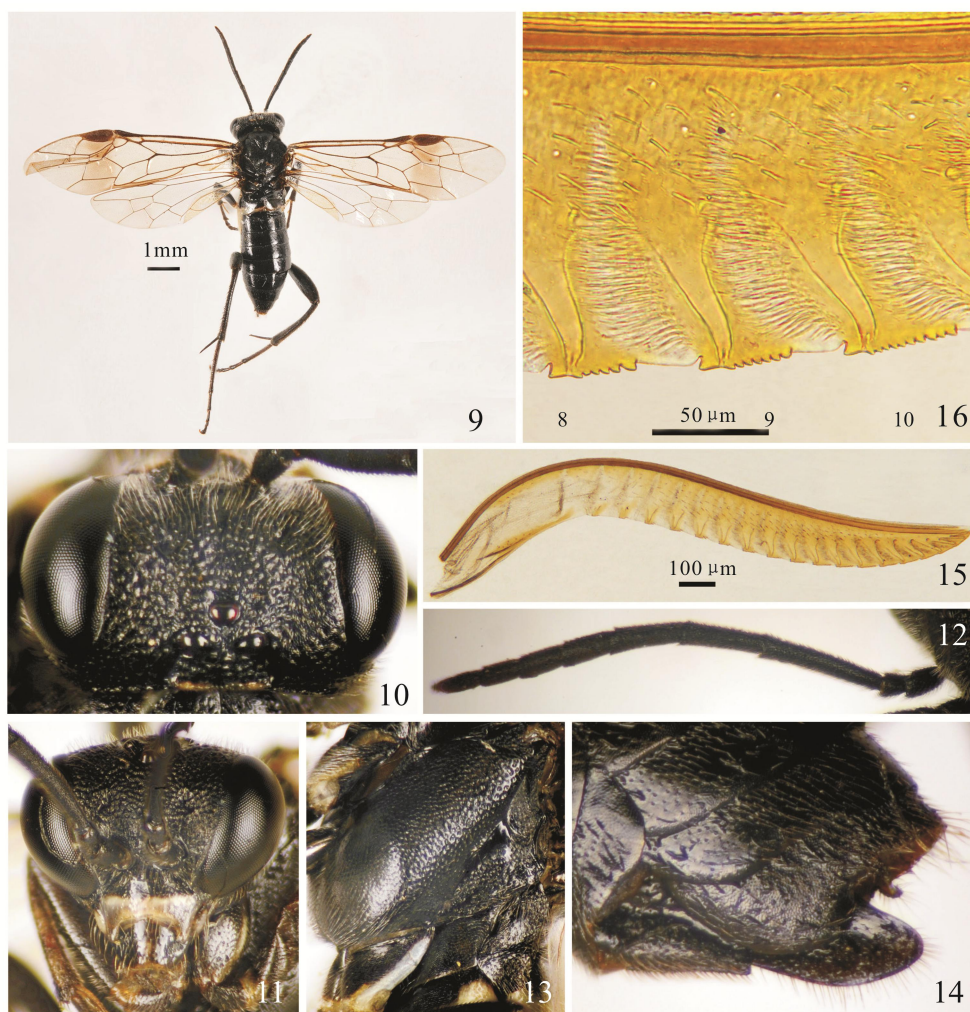
pronotum (at times), bands on lateral sides broader than center of abdominal tergum 1, transverse maculae of lateral corners of abdominal terga 3–6, stripes on outer sides of fore and middle coxae, an oval and long macula on outer side of hind coxa, apex on anterior side of fore femur and a small macula of subapical part dorsally of hind tibia; following parts pale yellowish-brown: apical margins of all coxae, trochanters 2 of fore and middle legs and hind trochanter. Body hairs short and dense, silver; setae on sheath slightly curved, pale black brown. Wings hyaline, pale smoky maculae largely, below stigma with pale smoky transverse bands narrower than stigma, bound not clear, stigma and veins largely black brown (Fig. 9).

Dorsum of head dull, frons rugosely and densely punctured, interspaces narrower than diameter of puncture, with fine microsculpture (Fig. 10); labrum and clypeus less shiny, both with sparse and shallow punctures, microsculpture fine. Mesonotum feebly shiny, minutely punctured, interspaces indistinct, with fine microsculpture; mesoscutellum feebly shiny, with some large and shallow punctures, without distinct microsculpture; mesoscutellum with slightly clear punctures and microsculptures; metascutellum without distinct punctures, but with distinct microsculptures. Mesepisternum less shiny, minutely and densely punctured, interspaces narrow; anepimeron dull, rugosely punctured and wrinkled; anterior margin 1/6 of katepimeron strongly shiny, without puncture or microsculpture, posterior part 5/6 of katepimeron with some shallow and large punctures and fine microsculpture; metepisternum dull, with fine punctures and microsculpture; metepimeron feebly shiny, with shallow punctures and distinct microsculptures (Fig. 13). Abdominal terga less shiny, base with some shallow punctures, apical parts without distinct puncture and with fine microsculpture. Hind coxa and outer side of hind femur with some minute punctures and weak microsculpture, feebly shiny. Surface of sheath coriaceous, with very fine punctures and microsculpture.

Labrum not large, middle of labrum distinctly elevated, anterior margin truncate; clypeus weakly elevated, base broader than distance between lower corner of eyes, lateral sides distinctly convergent forwards, anterior margin arch-like and incised to approximately 2/5 length of clypeus, lateral lobes narrow and long, anterior margin slightly acute (Fig. 11); malar space 0.5 times as broad as the diameter of middle ocellus; frons flat, slightly higher than top of eyes in lateral view; middle fovea distinct, lateral foveae indistinct, short furrow-like; interocellar furrow distinct, postocellar furrow indistinct; POL : OOL : OCL = 4 : 10 : 7; postocellar area slightly elevated, 2 times broader than long, lateral furrows deep, slightly divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete. Antenna slender, 1.2 times longer than head and thorax together (15 : 13), 0.9 times as long as abdomen (15 : 17); antennomere 2, 1.3 times as long as broad, antennomere 3, 1.7 times as long as antennomere 4 (5 : 3), 0.9 times as long as antennomeres 4 and 5 combined (10 : 11), subapical antennomeres weakly compressed and inflated (Fig. 12). Mesoscutellum distinctly elevated, with weak middle carina, without distinct peak and transverse lateral carina, as high as top of mesoscutum; mesoscutellar appendage with acute middle carina; metascutellum with low and short middle carina, mesopleuron and metapleuron as in Fig. 5; dorsal-posterior platform of mesepimeron as broad as diameter of middle ocellus; posterior corner of metepimeral appendage obtuse, without distinct appendage; distance between cenchri 2.5 times breadth of cenchrus. Inner tibial spur of hind leg 0.6 times length of hind tarsomere 1 (20 : 32); hind tarsomere 1 very slender, about 1.2 times as long as following 4 tarsomeres together (32 : 28); claw with inner tooth shorter than outer tooth. Ovipositor sheath shorter

than hind tarsomere 1 (3 : 4), apical sheath as long as basal sheath (7 : 8), apical margin roundish and narrow in lateral view (Fig. 14). Fore wing with crossvein cu-a joining cell 1M at basal 1/4, crossvein 2r joining cell 2Rs at apical 1/3, cell 2Rs clearly shorter than cell 1Rs; petiole of anal cell in fore wing 2 times longer than crossvein 1r-m and as long as crossvein cu-a; anal cell of hind wing slightly shorter than crossvein cu-a. Lancet with 18 serrulae (Fig. 15), middle serrulae slightly protruding and each with 1 proximal and 6–10 distal teeth, subbasal teeth large, annular spine bands broad, with slightly dense pilosity; 8th–10th serrulae as in Fig. 16.

Male unknown.



Figures 9–16. *Macrophya tenuitarsalina* Li, Liu & Wei sp. nov., ♀, holotype. 9. Adult female, dorsal view; 10. Head of female, dorsal view; 11. Head of female, frontal view; 12. Antenna of female; 13. Mesopleuron and metapleuron; 14. Ovipositor sheath, lateral view; 15. Lancet; 16. 8th–10th serrulae of lancet.

Holotype. ♀, China, Sichuan, Mt. Emeishan, Xixiangchi, alt. 2700 m, 19-VII-2001, Meicai WEI leg. **Paratypes.** 1♀, Sichuan, Mt. Emeishan, Leidongping, 29°546'N, 103°327'E; alt. 2350 m, 07-VII-2009, Meicai WEI leg.; 1♀, Sichuan, Mt. Emeishan, Leidongping, 29°546'N, 103°327'E; alt. 2350 m, 06-VII-2009, Yihai ZHONG leg.; 1♀, Sichuan, Mt. Emeishan, Leidongping, 29°32'N, 103°19'E; alt. 2400 m, 02-VII-2006, Hu ZHOU leg.; 1♀, Sichuan, Mt. Emeishan, Leidongping, 29°32'N, 103°19'E; alt. 2400 m, 26-VII-2006, Meicai WEI leg.

Individual variation. Hind tibia entirely black in female (1 specimen).

Etymology. The new specific epithet “*tenuitarsalina*” is derived from two Latin words, “*tenuis*” (slender) and “*tarsalina*” (tarsomere) referring to the hind tarsomere being very slender.

Remarks. This new species is similar to *M. constricta* Wei & Chen, 2002, but differs from the latter in having the dorsum of head dull, frons rugosely and densely punctured, interspaces narrow and with fine microsculpture; apical 2/3 of clypeus white, basal 1/3 black; frons flat, as high as top of eyes; posterior margin of postocellar area white; mesoscutellum entirely black; white maculae on posterior margin of abdominal terga 1 connected, lateral sides broader than middle; hind tarsomere 1 very slender; below stigma with pale smoky transverse bands narrower than stigma; middle serrulae of lancet with 6–10 distal teeth. In *M. constricta*, dorsum of head shiny, frons sparsely and shallowly punctured, interspaces broad and without microsculpture; clypeus entirely black; frons slightly depressed, lower than top of eyes; postocellar area entirely black; mesoscutellum not entirely black, center white; white maculae on posterior margin of abdominal tergum 1 not connected; hind tarsomere 1 slender; below stigma without smoky band; middle serrulae of lancet with 5–6 distal teeth.

Distribution. China (Sichuan).

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